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ABSTRACT

Action research is an umbrella term referring to research by practitioners for the purpose of improving their practice. Action research in higher education is being conducted by a growing number of practitioners whose formal training is outside of the discipline of education research. This has precipitated a need for faculty development and consequently, a conceptual model for analyzing the requisite skills for various action research methodologies, referred to as "tasks." L. Daniel, A. Ongwuegbuzie, and A. Dellinger have proposed a three-dimensional model for categorizing action research strategies based on three criteria: research goal, method of inquiry, and level of expertise needed to execute the research design. This paper extends the discussion of the three-dimensional requisite skills model to a global task-analysis model. Three major differences exist between these two models. First, rather than assessing the degree to which the research strategy varies from the practitioner's normal activity, the currently proposed model offers a means of analyzing the level of skill implied in a given action research strategy. The development needs of the practitioner can thus be matched to the task-analysis of the proposed study. Second, rather than a three-dimensional system, this pyramidal model is multidimensional. It is readily adaptable to any number of methods criteria that the faculty development facilitator deems appropriate. Third, the method presented in this paper provides a multidimensional model for conceptualizing the balance among the various criteria in the design of the study. It therefore can be applied not only as a skills analysis tool, but also as a tool for categorizing and describing the nature of a particular action research strategy. Examples are given for use of this model as a training tool, a research planning tool, and evaluation tool. (Contains 8 figures and 14 references.) (SLD)

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A Conceptual Model for a Task Analysis of Methods in Action Research Design

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Linda C. Kondrick

Arkansas Tech University

Kathy K. Franklin

University of Alabama

Paper presented at the

Mid-South Educational Research Association Annual Meeting

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Correspondence should be directed to the first author: College of Physical and Life Sciences, Arkansas Tech University, 1701 North Boulder, Russellville, AR 72801.

(e-mail: linda.kondrick@mail.atu.edu).

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Abstract

Action research is an umbrella term referring to research by practitioners for the purpose of improving their practice. Action research in higher education is being conducted by a growing number of practitioners whose formal training is outside of the discipline of education research. This has precipitated a need for faculty development and, consequently, a conceptual model for analyzing the requisite skills for various action research methodologies, hereafter referred to as tasks. Daniel, Onwuegbuzie, and Dellinger have proposed a three-dimensional model for categorizing action research strategies based upon three criteria: research goal, method of inquiry, and level of expertise needed to execute the research design. The paper at hand extends the discussion of this three-dimensional requisite-skills model to a global task-analysis model.

Three major differences exist between these two models. First, rather than assessing the degree to which the research strategy varies from the practitioner's normal activity, the currently proposed model offers a means of analyzing the level of skill implied in a given action research strategy. The development needs of the practitioner can thus be matched to the task-analysis of the proposed study. Second, rather than a 3-dimensional system, this pyramidal model is multi-dimensional. It is readily adaptable to any number of methods criteria that the faculty development facilitator deems appropriate. Third, the method presented in this paper provides a multi-dimensional model for conceptualizing the balance among the various criteria in the design of the study. It therefore can be applied not only as a skills analysis tool, but also as a tool for categorizing and describing the nature of a particular action research strategy. Examples

are given for use of this model as a training tool, a research planning tool and evaluation tool.

A Conceptual Model for a Task Analysis of Methods in Action Research Design

Action research is an umbrella term for research by practitioners for the purpose of improving their practice. Action research in higher education is being conducted by a growing number of practitioners whose formal training is outside of the discipline of education research (Barman, 2000, Schoenfeld, 1994). Additionally, K-12 Education professionals are generally exposed only to traditional education research methodologies, rather than action research strategies that they are more likely to utilize (McLean & Behringer, 2002). These circumstances have precipitated a need for faculty development that focuses on the growth of the reflective practioner; and, consequently, a conceptual model for analyzing the requisite skills for various action research methodologies, hereafter referred to as tasks.

Purpose of a Task Analysis Model

According to Miles and Huberman (1994, p. 9), "The aim [of action research] is to transform the social environment through a process of critical inquiry. . . .The analytic tasks emphasize the use of action-related constructs, seen in a melioristic frame, and intellectual 'emancipation' through unpacking taken-for-granted views and detecting invisible but oppressive structures." Yet the process of action-based critical inquiry itself is in need of unpacking. A melioristic frame is needed to clarify conceptual strategies for educators whose goal is to develop research practitioners. And the underlying structures of action-research design need to be more visible to the self-taught practitioner of critical inquiry. The purpose of this study is to develop a model that will emancipate the imagination of both those seeking to teach action-research and those endeavoring to practice action-research.

Current Problem in Developing Research Practitioners

Daniel, Onwuegbuzie, and Dellinger (2002) observed that the formal training of doctoral-level students has focused on experimental and post hoc research designs with little consideration for the unique parameters of action-research models, while the formal training of bachelor-level education students has favored action research paradigms at the expense of a firm grounding in the underlying research issues. According to them, "Less attention has been devoted to understanding research issues in action research, particularly as regards standards for assessing the sophistication or complexity of procedures used by action researchers and, concomitantly, the level of formal training that action researchers need in order to utilize various strategies" (p. 12).

Significance of the Task Analysis Model

Trends in the practice of social sciences, as well as the practice of math and science education are toward the development of research practitioners (Daniels, 2002; Barman, 2000; Mayo, 1997). However, the formal training of many of these practitioner-researchers often does not include a background in education research in general, or action research in particular. A conceptual model for a task analysis of methods in action research design potentially serves two camps: faculty who are engaged in the development of research practitioners and faculty who are engaged in the improvement of their practice.

Overview of Action Research Models

History and Philosophy of Action Research

Kurt Lewin (1948), a pioneer in social science methodology, transferred models of physical science constructs to models of social science constructs. Lewin (1975)

applied vector concepts, Force-Field Theory, to model the actions, interactions, and reactions of individuals and groups in social fields. He also developed a process, called Action Research, for investigating the cause-effect relationships in these social fields (1952). Zuber-Skerritt (1992) further developed this mode of scientific inquiry modeling the process of action research: "In brief, it is a spiral of cycles of action and research consisting of four major moments: *plan, act, observe* and *reflect*" (p. 11).

Action research is a versatile tool. McKernan (1991) noted that "Curriculum has no monopoly on action research." Diverse field of disciplines have employed action research as a tool to "improve the quality of life in social settings" (p. 3). The aim of action research has been to improve the outcome of the actions of the practitioner. As such, "Theories are not validated independently of practice and then applied to curriculum; rather they are validated through practice" (McKernan, p.4).

Action research is a unique paradigm. Although it grew out of the physical sciences, it is unique among scientific endeavors in its goals, its methods, and its standards. But far from being, psuedo-science, it is a science that operates under demands of time-sensitive conditions that, so-called, rigorous research cannot address. Argyris and Schön (1974) explicated the distinct advantage of action research over classic experimental designs: "This technology of rigorous research is based on diagnostic techniques that ignore or cannot cope with properties of effective action under real-time conditions: data may have to be ignored, feedback from the environment may be unavailable, and self-fulfilling prophecies may need to be accepted – they may indeed, be the essence of action' (p.4).

Models of Action Research

McKernan asserted that, "The validity of the concepts, models and results it generates depends not so much on scientific tests of truth as on their utility in helping practioners to act more effectively, skillfully and intelligently" (p.4).

In regards to modeling action research theories, Agryris, Putnam and McLain Smith (1990) maintained that, "The models we create in action science are shaped by our interest in helping human beings to make more informed choices in creating the worlds in which they are embedded . . . .our models should be "connectable" to concrete situations. We seek both generalizeability and attention to the individual case" (84).

Theories of action research. A model of action research must rest upon a theory.

Agryris et al (1990) argued that:

> The complexity of the design task far exceeds the information-processing capabilities of the human mind (Simon,1969). Designing action requires that agents construct a simplified representation of the environment and a manageable set of causal theories that prescribe how to achieve the intended consequences. It would be very inefficient to construct such representations and theories from scratch in each situation. Rather, agents learn a repertoire of concepts, schemas, and strategies, and they learn programs for drawing from their repertoire to design representations and action for unique situations. We speak of such design programs as *theories of action*. (p.81)

According to Agryris and Schön (1985), "Skills are the dimensions of the ability to behave effectively in situations of action", (p. 12). However, they caution that:

Learning a theory of action so as to become competent in professional practice does not consist of learning to recite the theory; the theory of action has not been learned in the most important sense until it can be put into practice. (p.12)

The Daniel, Onwuegbuzie, and Dellinger Action Research Model

Daniel et al (2002) proposed a model for identifying the levels of complexity in action research designs. Their three-dimensional model allowed for eight categories of research design based upon three criteria: research goal, method of inquiry, and level of expertise needed to execute the research design. In a graphic representation of this model, each criterion is represented as a dimension in a three dimensional co-ordinate system. Each of these three dimensions is treated as a continuum. The research goal (Purpose) is described as exploratory on one end, and confirmatory on the other end. The research method (Mode of Inquiry) is described as Naïve and Objective on the extreme ends. The level of expertise needed to execute the research design (Technical Sophistication) is described as practitioner related on the one end, and researcher related on the other end. The dimensions are referred to as continuums, yet the intersection of the three dimensions is limited to the extreme endpoints of each set of dimensions. This allows for only eight distinct categories of action research. These eight categories are depicted graphically as the eight corners of right rectangular prism. Yet, the authors themselves acknowledge that, "Action research as typically practiced actually encompasses a wide array of methodologies, procedures, and philosophical stances" (Daniels & Onwuegbuzie, 2002, p.10).

While the Daniels-Onwuegbuzie-Dellinger Model is a good beginning, the development of the model has been limited by the inflexibility of the graphic representation of the model. A new paradigm is needed to expand the basis of this model to include additional criteria that are considered of importance to either those seeking to teach action-research or those endeavoring to practice action-research. The following section describes the benefits of an alternative action research model proposed in this paper.

A Task Analysis Model for Action Research Methods

Three major differences exist between the Daniels-Onwuegbuzie-Dellinger Model (Daniels et al, 2002) and the Kondrick-Franklin Model presented in this paper. Each of these differences results in a more versatile, and comprehensive system for modeling action research methodologies. First, rather than assessing the degree to which the research strategy varies from the practitioner's normal activity, the currently proposed model offers a means of analyzing the level of skill implied in a given action research strategy. Therefore, the development needs of the practitioner can thus be matched to the task-analysis of the proposed study. Second, rather than a 3-dimensional system, this pyramidal model is multi-dimensional. It is readily adaptable to any number of methods criteria that the faculty development facilitator deems appropriate. Therefore, the description of action research designs is not limited to eight categories. Third, the method presented in this paper adds an entirely new facet to the action research model. This multi-dimensional model provides a method for conceptualizing the balance among the various criteria in the design of the study. This model can therefore be applied not only as

a skills analysis tool, but also as a tool for describing and comparing the nature of a multitude of particular action research strategies.

The Kondrick-Franklin Action Research Model

The authors of this paper outline here a model for task-analysis in action research methodology. This model is amenable to any number of criteria, or dimensions. Three basic dimensions are chosen for the standard model: Research Goal, Researcher's Intent, and Method of Inquiry. In a graphic representation of this model, each criterion is represented as the lateral edge of a regular pyramid. When three dimensions are analyzed, the base is an equilateral triangle. In Figure 1 below, the Research Goal is depicted as a continuum with Exploratory on one end and Confirmatory on the other end. Researcher's Goal is depicted as a continuum with Practitioner Related on one end and Researcher Related on the other end. The Methods of Inquiry construct is depicted as a continuum with Concrete Random on one end and Abstract Sequential on the other end.

Modeling the Dimensions of the Task

The task analysis model assumes that the degree of sophistication, or formal training required is greater at one end of the continuum. The ends of the continuums that require less formal training are oriented at the apex of the figure, while the ends requiring more formal training are oriented at the base of the figure. In the model depicted in Figure 1 below, Exploratory, Practitioner Related, and Concrete Random are positioned at the apex of the pyramid. Thus, it is assumed that studies intended to explore ideas which are for immediate use by the practitioner alone, whose method is based solely upon random observations of concrete phenomenon, requires less formal training than a

confirmatory study intended for publication, and involving a research methodology built upon abstract models, and sequential data analysis.

Insert Figure 1 about here.

Modeling the Technical Sophistication of the Task

In this model of task analysis, the magnitude of the cross sectional area of a given study is indicative of the degree of training required for a given action research design. In figure 2 below, the increasing level of complexity for four different studies is modeled by a triangular cross section with increasing area for each of the studies.

Insert figure 2 about here.

Modeling the Task Analysis Profile

The cross sectional area of a study is determined by the points on each continuum that describe the task-analysis for each criterion. In figure 3 below, the graphical analysis of a sample study is illustrated. The sample study is as much exploratory as confirmatory, it is intended primarily for the use of the practitioner, but might be shared informally as a case study of best practices, and relies upon sampling of local population data, perhaps with a Likert-scaled student survey of attitudes. The survey is not built upon any formal theoretical model, but represents random points about which the researcher wants to gather information. Some items on the survey are intended to confirm personal beliefs of the practitioners, others are intended to gain insight into student beliefs. The data collected will be reported using descriptive techniques. Each criterion analysis falls

midway in the continuum, and therefore creates a cross sectional area that is similar to the base.

Insert figure 3 about here.

Comparing the Task Analysis Profile for Two or More Studies

The profile of the previous sample study is compared with the graphical analysis of a another study, as illustrated in figure 4 below. The second sample study is mostly confirmatory in nature, few new insights are expected to be gained that would modify the researcher's hypothesis. This study is basically testing a hypothesis related to educational practices, that the researcher has been developing through successive stages.(Perhaps like the less sophisticated study in sample one above.) The researcher's intent is not only to improve the practitioner's own teaching practices, but to share the results of the study in a paper at a professional conference, or to expand the study into a university-wide program. The methodology employs a theoretical model based upon the retention effects of faculty mentoring of first semester freshmen. The data analysis employs a CSI inventory and basic comparative statistical analysis of retention figures.

Insert figure 4 about here.

Modeling Mixed Method Tasks

Because each criterion is represented as a continuum with greater sophistication at one end, an extension of the model is needed to analyze a mixed methods study. Figures 5 and 6 below illustrate the adaptability of this model to the analysis of mixed methods research. The qualitative and quantitative portions of the design may be analyzed separately, and yet be represented graphically as a whole. The relative lengths of the

central axes of each of the conjoined pyramids indicate the relative contribution of the qualitative and the quantitative components of the study. If both components are equally important to the study, the pyramids will be of the same height. The twin pyramids could also be used to represent the relative contributions of two distinct phases of a research design, both qualitative or both quantitative. In the case of the study illustrated in Figure 5, the quantitative study portion of the study is used to add depth to the findings of the central design of the study which is qualitative in nature. In Figure 6, the contributions of the two phases contribute equally to the study. In this case, the upper pyramid represents an initial confirmatory quantitative phase like a survey, coupled with an exploratory qualitative phase like follow up interviews.

Insert figures 5 and 6 about here.

Customizing the Task Analysis Model

Figures 7 and 8 below illustrate the adaptability of this method of graphical modeling to the inclusion of additional parameters that the researcher wishes to include in the analysis model. When four dimensions are analyzed, the base of the pyramid is a square; when five dimensions are analyzed, the base is a regular pentagon; when more dimensions are added, the base is a regular polygon with the same number of sides as the number of criteria analyzed. No matter how many sides the regular pyramid has, each criteria is represented as a continuum and it forms one edge of the figure. The relationship of the various criterion is described by the cross sectional area of the pyramid that these points determine. Note that when the level of sophistication is approximately the same for each criterion, the cross sectional area is a regular figure similar to the base. When one or more parameters indicate a level of sophistication considerably above or

below that of the other criteria, the irregular shape of the cross sectional area will indicate the mismatch. For instance it is unlikely that highly sophisticated statistical analysis would be employed in a largely exploratory study that is intended solely for the practitioner's use. Likewise, a confirmatory study, intended for publication would be expected to have a methodology grounded in an accepted theoretical model.

Insert figures 7 and 8 about here.

Conclusion

The value of the Action Research Task Analysis Model presented in this paper must be judged by its practical value. This model is intended for use by faculty who are engaged in the development of research practitioners as well as faculty who are engaged in the improvement of their own practice. One of the evaluation criteria for an instructional model is the goodness of fit between the model and the context of its use (Ryder, 2003).

As stated earlier, one value of this model is the ability of the research-practitioner to add, or delete, criterion continuum. Quite simply, the model can be adapted to the research task at hand or the philosophical perspective of the researcher. For example, in the Kondrick-Franklin Model the apex of the triangle are represented by the research triad of "exploratory", "practitioner intent", and "concrete-random". These labels reflect a quantitative perspective that is grounded in a positivist reality. The triad works well for this type of research focus. However, researchers that are informed by postmodern philosophies might find these triads incongruous with their global view of discovery and exploration. The Kondrick-Franklin Model provides flexibility in design by allowing the research-practitioner, or research-scholar, the opportunity to develop triads as deemed

appropriate to the task or philosophy. The value of the model does not reside in the labeling of continuum endpoints, but in the development of a mental model that supports task analysis of research, be it positivist or post-positivist in nature.

Mental Models in Theory

Byrne and Johnson-Laird (2002), likened mental models to an ". . . architect's models or to [a] physicists diagrams in that their structure is analogous to the structure of the situation that they represent, unlike, say, the structure of logical forms used in formal rule theories" (p. 1). Ryder (2003) lauded the use of models in instructional design:

> Models, like myths and metaphors, help us to make sense of our world. Whether it is derived from within or from serious research, a model offers its user a means of comprehending an otherwise incomprehensible problem. . . . Models help us to visualize the problem, to break it down into discrete, manageable units. The value of a specific model is determined within the context of use. Like any other instrument, a model assumes a specific intention of its user. A model should be judged by how well it mediates the designer's intention, how well it can share a work load, how effectively it shifts focus away from itself toward the object of the design activity. (p. 1)

Action Research Task Analysis Model in Practice

The Kondrick-Franklin Task Analysis Model is intended for use both as a teaching tool and as a planning tool. As a teaching tool, it is a flexible framework for conceptualizing the relationship between the action research process and action research methods. As a planning tool, it is a prescriptive framework for articulating the various dimensions of a proposed study.

A teaching tool. As a teaching tool, the Kondrick-Franklin model serves as a *graphic organizer*. According to Hartman (2003), " A graphic organizer is a teaching and learning tool, that aids in organizing ideas and concepts into a visual format. It is useful for students and teachers because it concretizes abstract information that can otherwise be overwhelming for students" (p.2).

This model helps the teacher to direct the student to fundamental questions that must be answered in order to proceed with a logical investigation of practices. It requires that students and teachers agree upon the essential dimensions of the overall task. It also requires that the dimensions answer questions that can be dichotomized. The three dimensions chosen for the standard model addresses the Goal of the Study, the Intent of the Researcher, and the Methods of Inquiry to be employed. Related to the Goal criterion, the student must answer these questions: What do you want to do? Explore possibilities, or confirm a hypothesis? In regards to Intent, the student must answer these questions: What do you want to do with the results of the study? Use them yourself? Share them formally, or informally with other practitioners? Finally, included in the analysis of the Method criterion, the student must answer these questions: What kind of data do you expect to gather? Is there a formal or informal model upon which the method of this study is based?

This model helps the teacher to focus the student upon the interaction of the selected dimensions. It requires them to graphically represent the relationship between Purpose and Method, Method and Intent, and Intent and Purpose. It thus facilitates the development of a comprehensive rationale that unifies the various dimensions of the study. The standard model validates internal validity of concrete random methods,

employed in an exploratory study for use by the researcher alone. It also explicates the need for theoretical models, and reliability estimates, in a confirmatory study intended for scholarly review.

A planning tool. As a planning tool, the model serves as *task analysis strategy.* According to Brown (1998), the Kondrick-Franklin Model would be categorized as a *Cognitive Task analysis Model*:

> Cognitive task analysis attempts to determine the thought processes workers follow to perform the tasks and identify the knowledge needed to perform the tasks at various levels, e.g. novice and expert (Hanser 1995) It is a process used to gather information on worker behavior in problem-solving situations that highlights the interactive and constructive nature of everyday knowledge and the social constraints that influence the problem solving (Llorente 1996). (p. 2)

In the case of the standard model presented in this paper, the interactive and constructive nature of the knowledge is modeled as the profile and magnitude of the cross-section generated by the task analysis of the three dimensions. The social constraints that influence the problem solving are embodied in the dimensions of Researcher Intent, and Research Goal which together mitigate the Method of Inquiry selected. Without such a model as this, this relationship between the dimensions is not at all transparent to those not educated in research methods in general, or action research methods in particular.

Testing the Effectiveness of the Model

It is one thing to propose a model of action research task-analysis, it is another thing to use that model as an effective tool in the improvement of education practices

(Argyris & Schön, 1974; Argyris et al,1990) . Since this model is intended for use by instructors and practitioners of action research, it is especially important that it be tested in the practical domain. Continual refining of a theoretical model, even one built upon practical experiences, is of little use until it is used. The proof of the validity of this model resides its ability to aid the instructor of action research to teach more effectively; and its ability to aid the practitioner of action research to develop a research plan more effectively. It is therefore recommended that the next stage of the development of this Task-Analysis Model of Action Research, be to put the model to test in an Action-Research Study.

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Appendices

Task Analysis Model Graphics

Figures 1-8

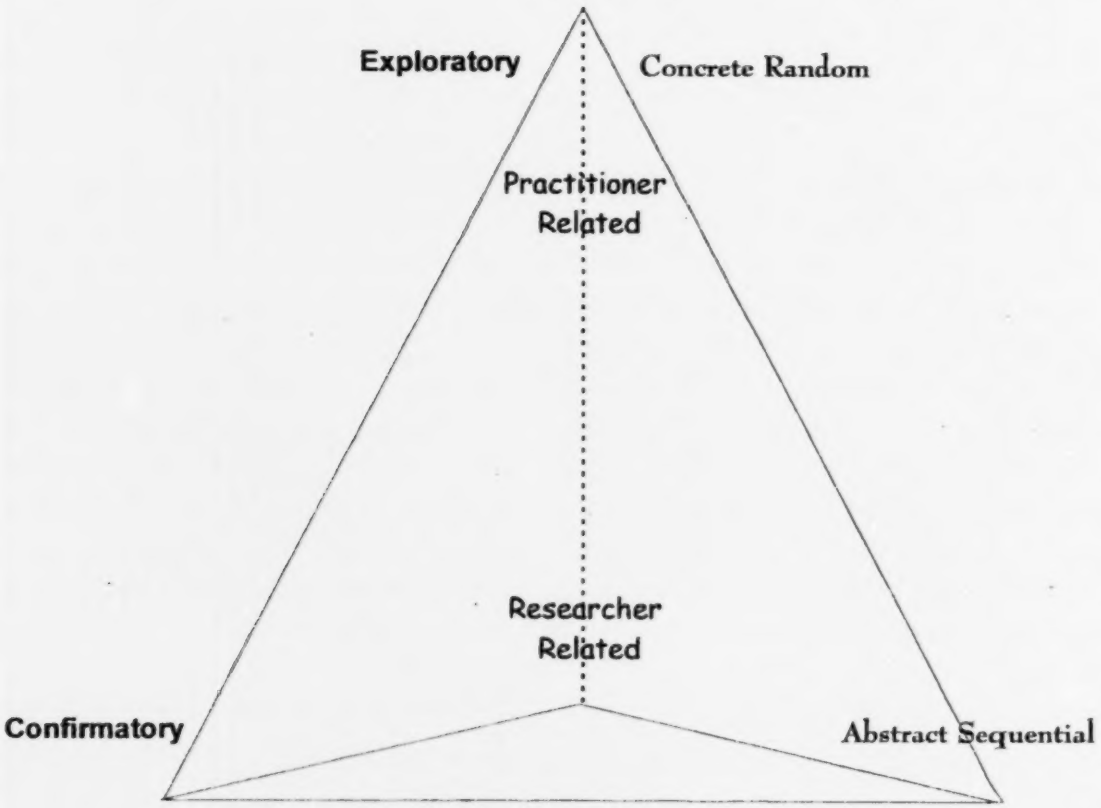

Figure 1: This Task Analysis Model represents the three chosen criteria as the lateral edges of a a triangular pyramid.

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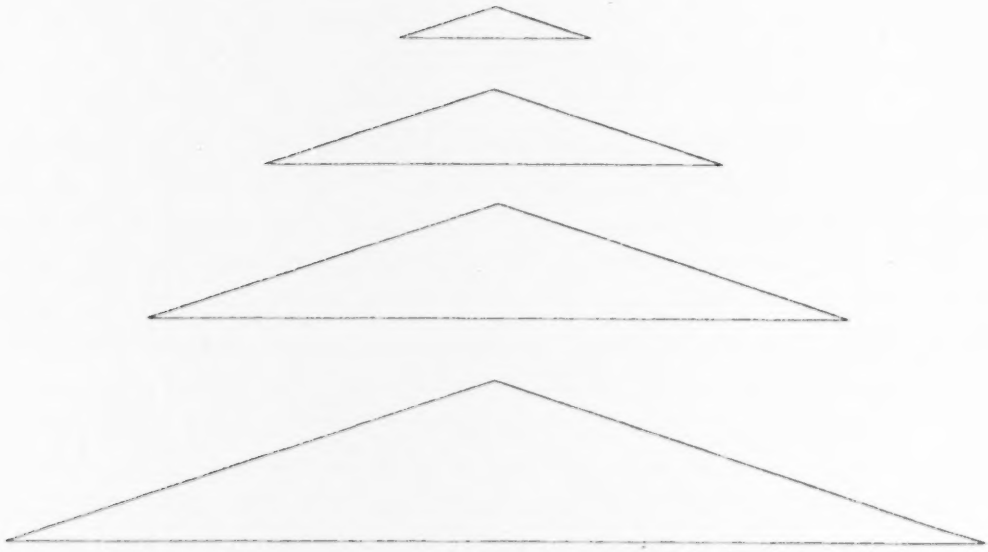

Figure 2: The cross-sectional area of the Task Analysis Model characterizes the level of sophistication of the methods needed to achieve the purpose of the study.

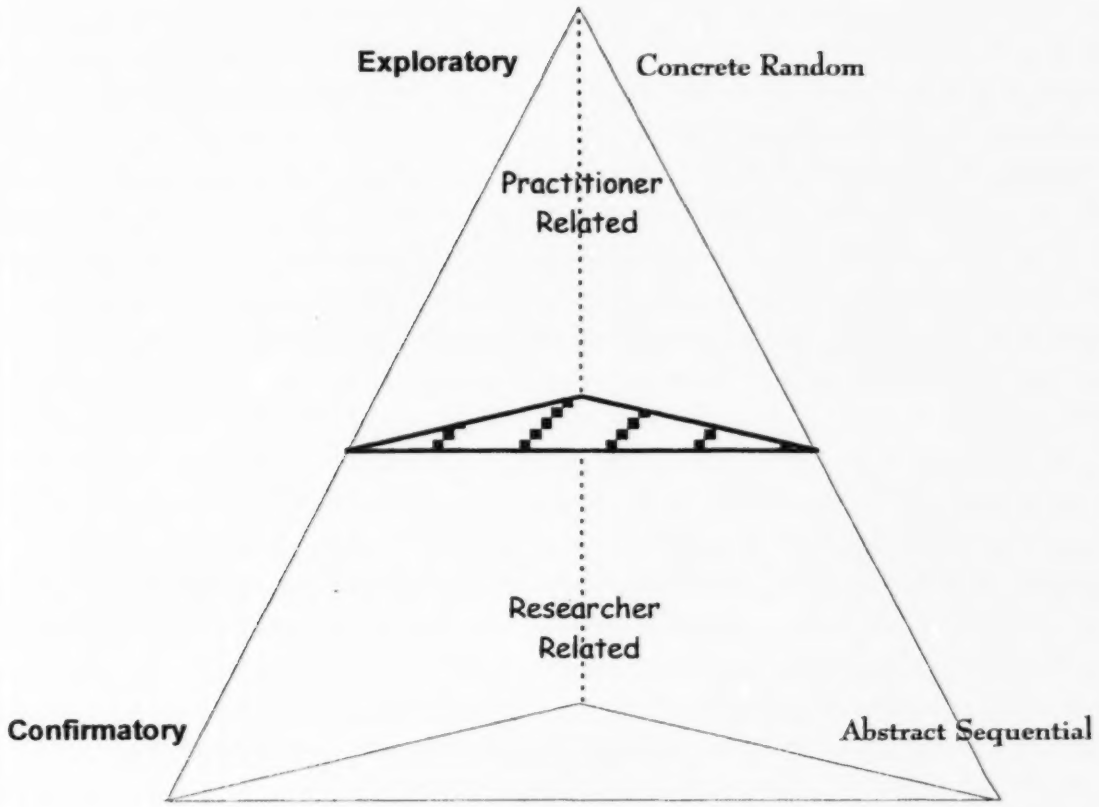

Figure 3: This cross sectional area of this Task Analysis Model represents a study in which each of the three chosen criteria falls midway in its continuum.

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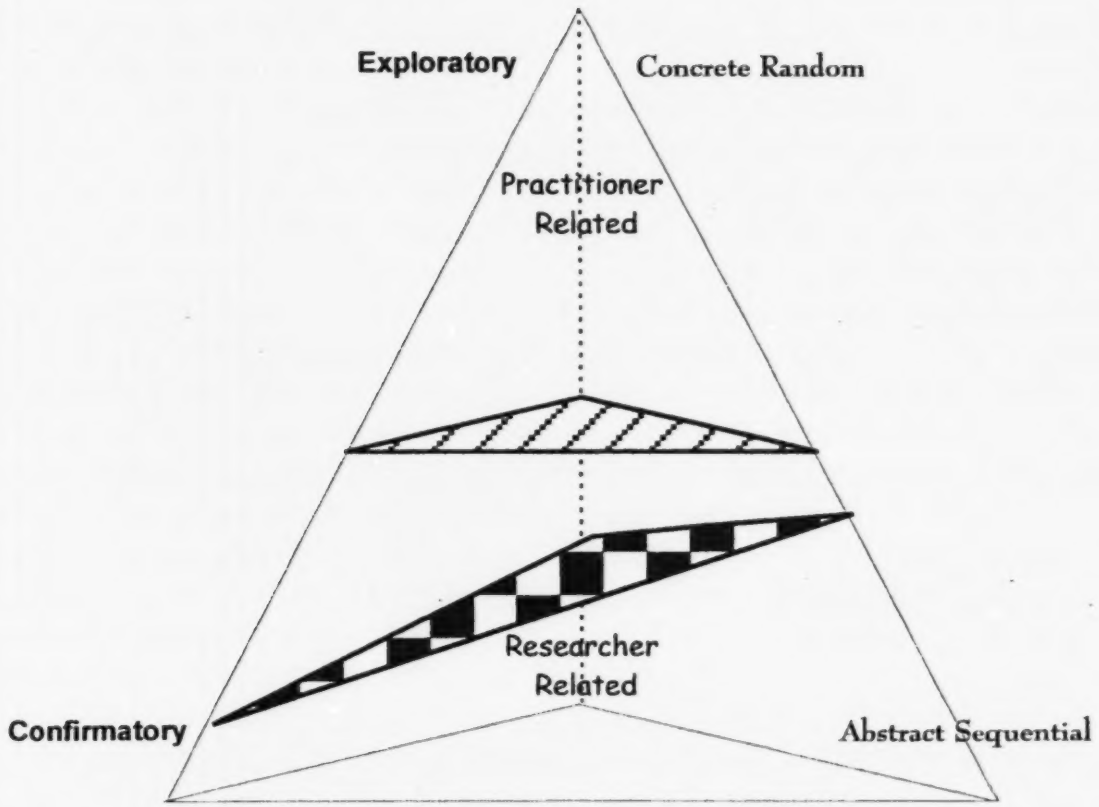

Figure 4: The cross sectional areas of this Task Analysis Model represents two studies: one in which each of the three chosen criteria falls midway in its continuum and another where the study is much confirmatory, and research related.

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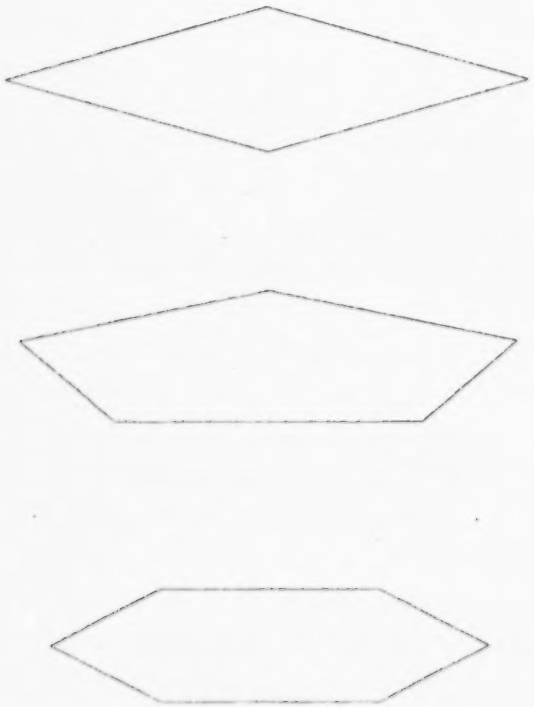

Figure 5: The number of criteria included in the Task Analysis Model may be adjusted by adjusting the number of vertices in the base polygon.

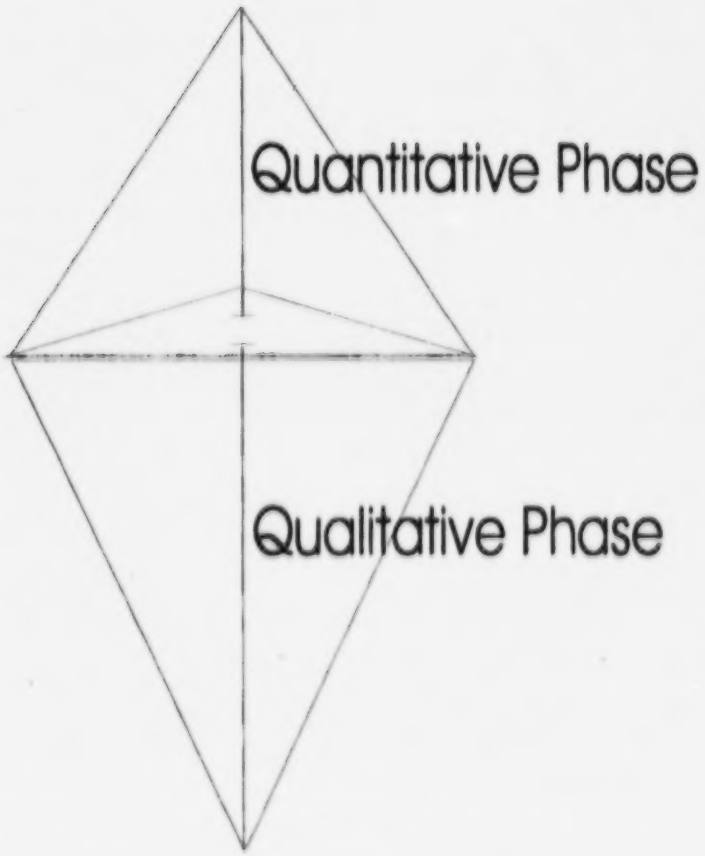

Figure 6: The profile of the kite formed by the edges of the Task Analysis Model represents the relative contribution of the quantitative and the qualitative methods employed in the study. The qualitative components of this study were more extensive than the quantitative components.

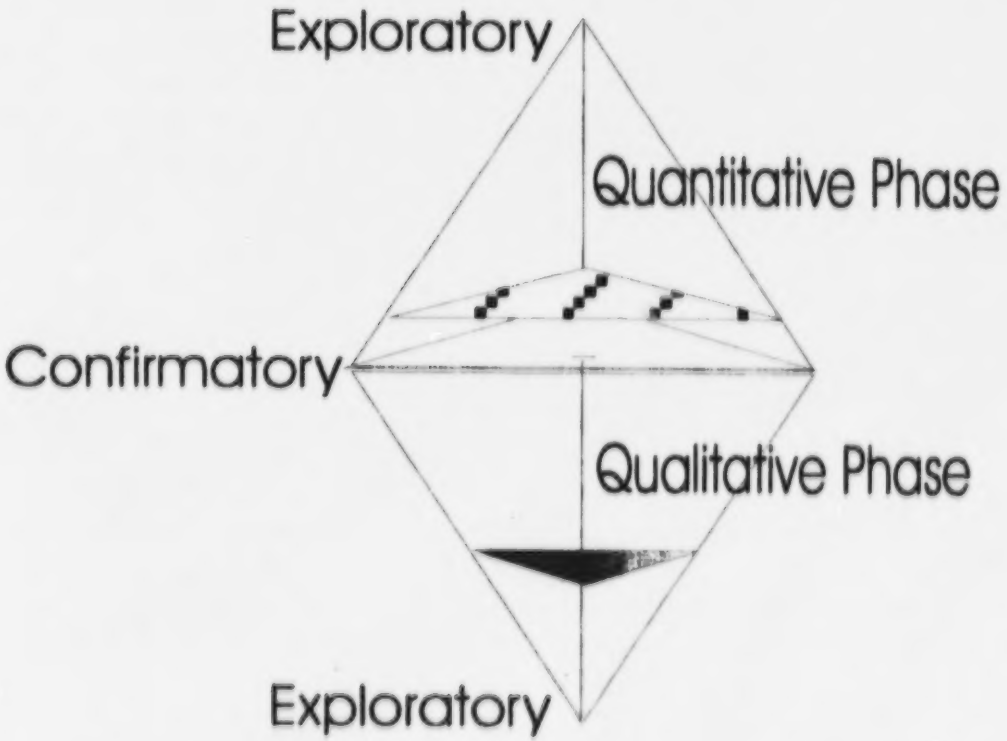

Figure 7: The profile of the kite formed by the edges of the Task Analysis Model represents a combined methods study in which the quantitative and the qualitative methods are equally important to the study. The cross sectional areas indicate a largely confirmatory quantitative phase combined with a largely exploratory qualitative phase.

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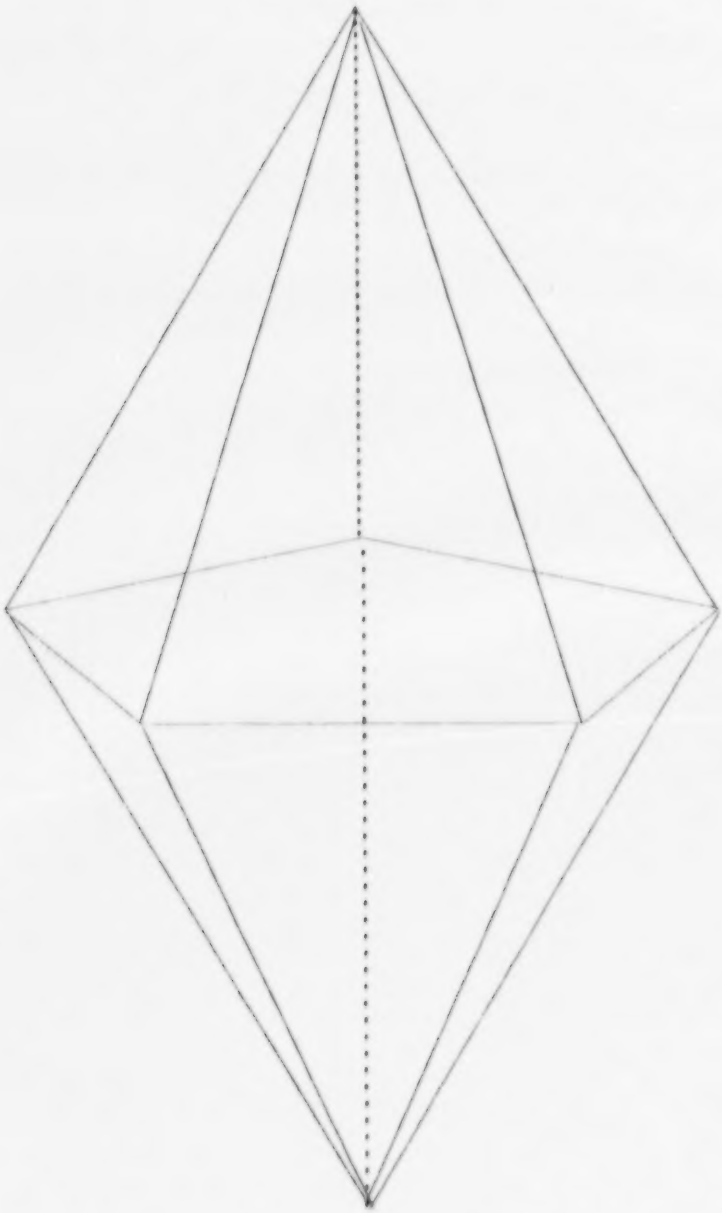

Figure 8: A Task Analysis Model representing six criteria.

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Organization/Address: 1701 N Boulder, Russellville, AR 72801	Telephone: 479 497 1768 FAX:
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